Cultivated plant diversity structures arthropod food webs in multi-specific plantain based agroecosystems

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Intercropping is a practical way to increase plant diversity in agroecosystems and participates to provide alternative foods and to structure arthropod communities, including generalist predators involved in pest control (Dassou et al. 2015). Plantain-based agroecosystems are especially useful for studying the effects of plant diversity because they contain few to many non-plantain crop plants, a variety of spatial organizations, and few to no inputs of pesticide or fertilizer. Banana weevil *Cosmopolites sordidus* is major pest of banana fields. We measured the effect of cultivated plant diversity on the structure of the arthropod food web and on the control of banana weevils.

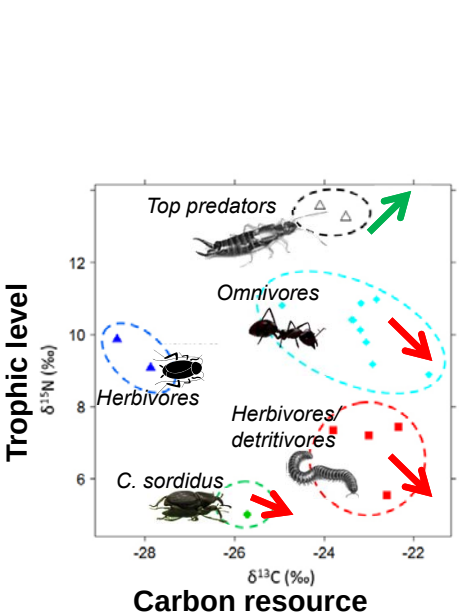
What is the effect of plant diversity on the arthropod community in plantain-based agroecosystems?

- In 20 plantain fields in Cameroun, we measured all cultivated plants and the abundance of arthropods with shelter traps and bait traps
- We constituted arthropod trophic groups based on stable isotope signatures

2 cultivated species

Gradient of plant diversity explored in plantain agroecosystems

>20 cultivated species



→ Top predator group was enhanced by plant diversity

→ Lower trophic groups were negatively (or not) correlated to plant diversity

Fig.1. *Homogeneous trophic groups defined by their $\delta^{13}C$ and $\delta^{15}N$ signatures. Arrows show the effect of cultivated plant diversity on the abundance of trophic groups*

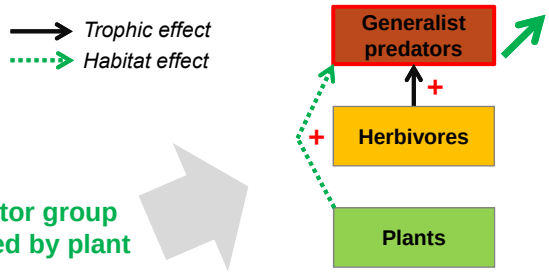


Fig. 2.A. Bottom-up and habitat effects increased with plant diversity

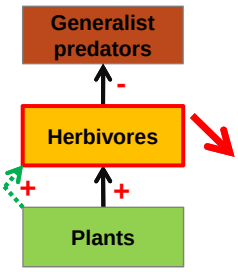


Fig.2.B. Top-down control increased with plant diversity → Negative overall effect of plant diversity

Fig.2. *Representation of the effect of plant diversity on both trophic and habitat effects for generalist predators (A) and herbivores (B)*

→Top-down forces structured the arthropod trophic groups in plantain agroecosystems

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Reference

A., G. Dassou, D. Carval, S. Dépigny, G. Fansi, P. Tixier, 2015. Ant abundance and Cosmopolites sordidus damage in plantain fields as affected by intercropping. Biological Control, 81, 51-57.